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Insights for Korean Reunification from Research on Integration Processes in Physical, Biological, and social Systems

This paper addresses the question, "Can general systems insights help in planning reunification (that is, integration) of South and North Korea." The paper introduces a new and unique set of design rules derived from analysis of a pair of systems processes that were recently discovered and from interactions between these new processes and other established systems processes. The design maxims produced are very general and so do not present an answer to the reunification problem. However, they are a sufficiently diverse to generate fruitful discussion of the complexity of the problem.

Recent systems research indicates that the opposing mechanisms of integration and fragmentation are fundamental processes found in a wide variety of human and natural systems. This paper begins by citing numerous cases of integration and fragmentation in socio-economic and political affairs of today to indicate the timeliness of the topic, the vast number of people effected, and its importance. It suggests that these

widespread processes are systems-level isomorphies and suggests that they and other systems isomorphies can be used to derive potent decision-making and problem-solving rules. Some rules are derived from hierarchy, hypercycle, feedback, and emergence research as examples of the utility of isomorphies in suggesting rules. The paper continues with a broad survey of key historical examples of integration and fragmentation in physical, biological and social systems across billions of years. These examples are then analyzed in detail to identify the most important mechanisms that cause integration and fragmentation. The purpose of this analysis is to discover recommendations on how to best promote integration and avoid fragmentation in Korea. Thirty-one specific obstacles, and twenty-five specific promoters of Korean integration are surveyed, related to systems processes, and then distilled into twenty-seven general rules for integration. Particular attention is given to identifying integration and fragmentation processes that have been misunderstood and so contribute to current human tragedies on a massive scale, and to the specific challenge facing the Korean people as they consider the challenging possibility of reunification.

Keywords: isomorphies; integration processes; fragmentation processes; I-F cycles; hierarchies; hypercycles; emergence; flows; feedback; the "deabstraction" gap;

1. INTEGRATION AND FRAGMENTATION IN CURRENT CRISIS PROBLEMS

Integration Events

There are many interesting examples of ongoing integration in the modern political world. A survey list would include: (1) the reunification of East and West Germany; (2) the Economic Common Market and Monetary system for Western Europe; (3) the attempt at inclusion of Eastern European countries in NATO; (4) the emerging common market in North and Central America through NAFTA; (5) the attempts by China to absorb Hong-Kong and Taiwan; (6) the ethnic purity movements in the former Yugoslavia and Czechoslovakia, and former parts of the Soviet Union which may be seen as local integration within ethnically homogeneous regions; (7) the attempted cooperation between geographically separated Islamic regimes; (8) the attempt to create a unified society in South Africa; (9) the emergence and astounding growth curve of integrated computer networks such as the World Wide Web; (10) the attempt to reintegrate portions of the Middle East (e.g. Iraq & Iran; Iraq & Kuwait; all wars with Israel, etc.) as representative of attempts to unify by means of force; (11) the realism of our growing internationally interdependent economic systems; (12) the announced intent to reestablish the former Soviet Union; (13) the ongoing work at reintegrating No. and So. Vietnam; (14) the gradual, but growing, cooperation internationally for protection of the environment; and finally, the focus of this paper, (15) potential Korean reunification.

Similarities and Differences with Korean Situation

Some of the above share features with the proposed reintegration of Korea. For example, both the German and Chinese situations also occurred between communist societies and democracies. They also are integrations that occurred within primarily a single ethnic grouping. Several of the above point up the primary importance of the economy and the near-term quality of life in maintaining any political integration that is initiated (cf. the Russian experience, and recent reports of the longer term dissatisfaction of North Korean defectors after difficulties in adapting to capitalism in South Korea [45]).

However, the socio-economic and political obstacles facing reunification of Korea have special features which distinguish it from the above. For example, the German and Chinese situations did not have the recent history of war and atrocities within the ethnic group that has produced immense feelings of distrust in the Korean situation. For lessons from the recent German state integration see [3, 28, 34, 46].

Fragmentations Events

It is ironic that the list of fragmentations occurring simultaneously with the integrations in our modern world is equally long. These fragmentations-in-progress would include: (1) the incredibly rapid USSR break-up into dozens of nation-states; (2) the agonizing disintegration of Yugoslavia into Serbian, Croation, and Muslim enclaves; (3) the widespread increase in religious fundamentalism which has created hostility and mistrust between systems of thought that are, ironically, otherwise dedicated to harmony and integration; (4) the internal demand for isolationism, xenophobia, and trade

protectionism in America, Japan, Russia, Austria, France, and other countries [see 11 e.g.]; (5) the increasing tensions in Canada for Quebec secession; (6) the emergence of a movement in Italy to separate into North and South (or return to historical city-state organization); (7) the increasing tensions in the so-called United Kingdom for separation with Ireland or separation of Ireland (and truth-to-be-told Scotland too); (8) the disintegration of nations in Africa along tribal and ethnic lines resulting in massacres; (9) the increasing probability that immigrants will not merge with their new host society accompanied by increasing backlash and violence (e.g. in America, Germany); (10) the several instances of fracturing of former geographic wholes by conflict within (e.g. Lebanon, Palestine, etc.); (11) the increasing distrust and lack of cooperation between "developed" and "developing" countries in general; and finally, the focus of this paper (12) the continued separation of North and South Korea.

Gathering this otherwise vast and confusing diversity of current political events into two major types of change helps to simplify the complexity and enables our discovery of patterns. It is fair to say that the pace of both integration and fragmentation in modern times exceeds all historical precedent simply because there are so many more people and nations (post W.W.II, the number of nations doubled) and the general pace of socio-economic-political change has increased many fold. The numbers of people effected worldwide by just these two general categories of change is staggering. Virtually, everyone and every society is involved. In Korea alone millions of humans are directly and profoundly influenced by the competition between the forces of integration and fragmentation.

When one is so much inside of a change-in-progress, it is hard to

analyze the change and produce productive insights. We are blinded by our participation. In addition, change in social systems is the hardest of all to understand, analyze, predict, or control. Here we will use our distance in time and space from changes in natural systems (integrations and fragmentations), and our distance from past changes in social systems (also integrations and fragmentations) to help us discover and distill insights into these fundamental change processes — both of which are central to the complex problem of Korean reunification. (hereafter I = integration and F = fragmentation as abbreviations)

2. TENETS OF GENERAL SYSTEMS SCIENCE APPLIED TO THESE DIVERSE SOCIO-POLITICAL EVENTS

One of the main tenets of this paper is that the farther removed one is from a system, the easier it is to gain useful insights into its behavior. Another tenet is that natural systems and social Systems at their most general level of structure and process are more similar than different so that insights gained from natural systems can help in understanding and even engineering social systems [42]. Both of these tenets are closely related to the practices of general systems science (= GSS). GSS focuses not on the particulars of systems, but on much more abstracted general processes acting on the particulars. That is why GSS is not widely accepted by the natural sciences, which focus in a very reductionist way on the particulars, or by the general public, who make their daily living by manipulating the particulars. GSS compares particular systems to discover only those general patterns common to

all systems. To perceive these general patterns and processes, the observer must travel many levels of abstraction from the particulars of daily life. We call such general regularities isomorphies because they have the "same" (iso) "form" (morphy) in many different manifestations. Once these general regularities (such as feedback, cycling, hierarchy, etc.) are defined, they can be used to understand, explain, and perhaps someday even control or better design numerous systems. Their power comes from their breadth of application [39].

Two insights about systems isomorphies, often overlooked even in the systems literature, are important to our application of general systems concepts to the Korean reunification problem. The first insight involves the statistical "Law of Large Numbers" which is critically important to understanding how and why isomorphies occur in nature. Stable systems only form after very large numbers of repeated attempts, among astronomical numbers of entities within a natural scale, and after very long amounts of time. Notice that this involves three sets of very large numbers acting in concert simultaneously. Witness these numbers in the later citations of I&F Cycles in natural history (e.g. origins of the stars, the elements, origins of life chemicals, origins of genetics, etc.) The second insight involves the distinction between "mature" and "immature" systems and is related to the first. While natural systems may be defined in most cases as "mature" systems, human-based social systems are "immature" in most cases. While natural systems have experienced all three sets of large numbers over billions of years of evolution, without the influences of human free will, social systems have existed probably less than a few thousand years and are effected by the ability of human willfulness to avoid the most economical and simplest organization. Therefore, isomorphies are

more pronounced and regular in natural systems than they are in human systems. In many cases isomorphic processes are counterintuitive to humans and resisted by human systems. This is precisely the problem for challenges like reunification and creates the potential for vastly improved design and decision-making if only humans can learn to recognize and use systems isomorphies [42]. There is some recognition that large numbers of human actions taken together constitute the beginnings of whole systems behavior in work like that of Schelling's *Micromotives and Macrobehavior* [33], but social and political experts, in general, have apparently ignored such insights because they are so far ahead of their contemporaries.

This paper also develops awareness of two presumptive isomorphies that are not frequently found explicitly defined in the GSS literature, namely integration processes and fragmentation processes. The list of current cases in socio-political systems given above should be compared with the list of I&F processes in the physical and biological systems described below. When all of these are compared, it should be evident to the reader that I&F processes are isomorphic in all of these different systems over a truly vast sample of time and space. As such they are good examples of the GSS knowledge base of isomorphies. But it should also be clear that the debates that rage around the 27 examples of current political I&F have not used insights from study of I&F as general isomarphic processes and so have missed some potentially valuable and simplifying rules for better planning of, control of, or harmony between incipient integrations and fragmentations.

3. THE GENERAL TO THE SPECIFIC: SYSTEMS LESSONS FOR KOREAN REUNIFICATION

The most difficult and treacherous step in planning lies in translating and applying the very general wisdom of the ancients to the very detailed specifics of any particular case. At this fundamental level there is little difference between planning one's personal life and planning the life of a nation. When you attempt to apply the genius of Sun-Tzu, or Lao-Tzu, or Confucious, or Buddha treasured in so many aphorisms to yourself or to weighty matters of state, you face the same difficulty. Most often there is not a simple correspondence between the general rule and the particulars of the dilemma you seek to resolve. This problem is the same when trying to apply the lessons of general systems theory to practical problems. This may be called the pervasive "deabstraction" gap. It demands more research attention, but receives little. It demands the creation of new tools to help more planners and people more successfully apply proven general rules to specific conditions, yet these tools have not yet appeared.

At every step in this analysis of I-F processes, applications will be made to the Korean Reunification problem. We will include suggestions, when possible, how the "deabstraction" gap can be bridged.

4. PREVIEW: INSIGHTS INTO KOREAN REUNIFICATION FROM INTEGRATION ASPECTS OF HIERARCHIES, HYPERCYCLES, FLOWS, EMERGENCE, & EQUILIBRIUM

To show how isomorphies might help us engineer better integrations, let's examine a summary of aphorisms that derive from integration aspects of other isomorphies before digressing on a long survey and analysis of I-F events in natural systems.

Several generalizations can be made about integrations and fragmentations in-progress which derive from analyzing them in the context of systems science concepts like hierarchy, hypercycles, emergence theory (self-organization and origins), chaos theory, and dynamic equilibrium. Our Institute has identified numerous and specific "linkage propositions" among these isomorphies and the processes of integration and fragmentation. The "linkage proposition" model of GSS is explained in a series of papers elsewhere [44]. In this paper we will limit discussion to the application of systems science "isomorphies" and "linkage propositions" to the Korean reunification problem. The ideas presented in this section are only a sampling of those possible in each category. The "rules" or "integration aphorisms" that may help integration are presented here in italics and collected at the end of the paper. It is most important to recognize that the "linkage proposition" set is indeed a whole system in itself; individual linkages, and consequently aphorisms or rules derived from them, may not make much sense when taken alone; they must be applied and developed altogether.

Hierarchy Theory

Hierarchies were unfortunately first discovered in social systems with the result that they have been confused since then solely with "authority" structures. When we study natural hierarchies empirically or conceptually, as we have extensively at our Institute [41], we were startled to discover that in many significant cases bottom-up forces are superior in strength and variety, and a greater determinant of future states than top-down forces. One might suggest that this is why revolutions occur in history and why democracies have succeeded dictatorships in human history. *Rule: Focus on improving the lowest levels of the hierarchy to improve the system for the longest term.* As South Korea approaches the North it may be that focusing only on the top of the inflexible political (Kim Jong-il) and military hierarchy is fated to failure [1, 15, 24, 27, 36]. More attention should be paid to long-term development of contacts with and bonding with the medium to lower levels of the hierarchy. When they are engaged, the future will be determined. It is important here to see through the rhetoric of communism to its reality in terms of hierarchy theory. Communist Russian, Chinese, and No. Korean philosophies state categorically that the society exists for bettering the quality of life for the lowest members of the hierarchy, but in action it has become clear that the opposite occurs, and only the highest levels of the hierarchy thrive at the expense of the lowest. Even after nominal revision to a capitalist system, Russia has shown this feature, because it is a society ruled by an oligarchy of opportunists, whether communist or capitalist, that disregards the higher moral purposes of improving the bulk of society in pursuit of selfish interests. We will return to this.

Our empirical studies also have indicated a non-trivial "clustering" of objects into natural levels, and that these levels are not those most easily and often identified by casual human observation [41]. This is reminiscent of the ancient Asian anecdote about the king asking the butcher how he could possibly cut the meat so swiftly and easily ("by finding the natural joints"). Korean societies, like most, are composed of human determined clusters that often do not fit the most efficient natural clustering. If the South is permitted to help North Korea, it will be essential to identify the "true natural clusters" and devise a help plan specific to each of these different clusters. The natural clusters will probably be totally different from those normally considered. *Rule: Discover empirical criteria for identification of the natural improvement clusters (sectors) in North Korea.* It might be more effective, for example, to develop quite different plans for the mineral resource rich Northeastern corridor of No. Korea, as distinct from the farming belt, as distinct from Pyongyang itself. Without careful planning that seeks to capitalize economically on the different strengths (or weaknesses) of each of these micro-regions, the total plan is doomed to failure [4, 26, 33, 37, 47].

Further, it might be very important for the South to try to help a limited number of clusters at a time to not swamp the economic system of the South before the North improves enough to help itself. German unification did not consider this systems insight possibly because the wealthy West thought it was sufficiently well-endowed to make bootstrapping of the East easy [3, 28, 34, 46]. Capitalist states are typically as overconfident of their systems as communist ones have been in the past. But in reality both have limitations and integration of any system is very costly. Estimates run as high as a $1 trillion for

Korean unification [18, 35, 47]. *Rule: Devise unique plans for each identified natural cluster*. By carefully timing subsets of clusters for improvement in a defined and studied sequence, the moneys will be more effectively spent. Any moneys earmarked to help in future Korean reunification must be allocated only after their utility is proven. For example, the rather large sums granted to No. Korean defectors were often lost by those defectors due to their lack of knowledge and lack of training in capitalist Pitfalls as well as opportunities [45]. This could have been avoided by a little foresight and modest funding. *Rule: Extensive training and acclimation programs must be initiated before any particular natural cluster is financed for assimilation.*

We also have observed that hierarchies are not opposed to networks as is commonly held in current management and planning teaching. In fact, it can be mathematically proven that clustering hierarchies and networks are in many cases direct transforms of each other as represented metaphorically by graphics in our Institute's Integrated Science multimedia courseware [40]. The animation shown in the presentation of this paper indicates how networks become hierarchies. In the case of No. Korea, *Rule: To encourage a new hierarchy, you must enable a new network of interactions within the infrastructure*. There are many practical ways to enable a new network of closely coupled interactions within subclusters of the No. Korean society as the disintegration of the current regime gives openings.

A fifth example of hierarchical insights for reunification derives from the clusters in the hierarchical age pyramid of both Koreas. This natural clustering has important, but differing and sometimes mutually exclusive influences on the motivation of the population to unify Korea [19]. *Rule: identify and use the forces of each cluster or level of the*

natural hierarchical age pyramid to enhance participation of the whole population. Older age clusters remember the horrors of the war and may harbor hostilities that the younger do not. Older remember the separation of once whole families and may still want to reunite them, younger do not. Older come from a time when the virtue of self-sacrifice was inbuilt. The younger generations will be the ones who must pay the highest economic price and because of long-term capitalist experience may have less internal valuing of self-sacrifice and ability to postpone gratification. Younger possess great energy for change and for less corruption. Elders have the responsibility of helping them harvest and focus this energy for the moral goods of reunification.

Hypercycle Research

Hypercycle research has achieved its best results in biochemical systems studied by Nobel Laureate Eigen [5]. One of the discoveries indicates that ... *Rule: new hypercycles can only replace older hypercycles if the new cycle is orders of magnitude better or more efficient than the old*. This results in the well known "chicken and the egg" or "catch-22" dilemma. How can the new hypercycle initiate if it requires the resources of the old hypercycle. Generally, it appears that the new hypercycle must initiate and develop independent of the old hypercycle until it reaches sufficient maturity to overtake the old because of its much greater efficiency. Two lessons emerge from this for Korean reunification especially considering the isolationism and inflexibility of established "juche." *Rule: Develop the basics of the No. Korean new social system as an improved network of hypercycles apart from the old No. Korean social system*. Significant study by So. Korea must be initiated to design alternative internal structures and processes

Also *Rule: The new No. Korean social system must be demonstrated to be much more productive and efficient than the old as regards the most numerous and lowest hierarchical levels of society before any attempt is made for it to replace the old.*

Flows

Chaos Theory [2, 6], Forrester's *Systems Dynamics*, Odum's Systems Ecology [25], and my own Linkage Proposition Systems Model [44] all emphasize flows between interconnected entities as the critical first step to systems origin. How can we induce flows between a relatively open system like capitalist So. Korea and a decidedly closed system (cf. discussion of "juche") like the North. Flows usually happen because of a differential in energy or concentration. But the natural flow that would occur within a unified Korea is totally blocked by "juche" politics and learned values. Perhaps the most important tactic for So. Korea to pursue is to ... *Rule: Find openings that are non-threatening to the No. to establish much increased flows of information, material, and people between So. and No. and No. and all other countries. These flows, in themselves, will begin to favor an environment that leads to unification.*

Systems Evolution and Emergence Theory

The growing attention paid to systems-level evolution joins recent extensions of classical biological evolutionary theory in stressing the importance of "punctuated equilibrium" mechanisms to our understanding of Darwinian gradualist mechanisms. Our own conference organizer, Dr. Rhee, has applied the concepts of systems and of evolutionary mechanisms to socio-political change [29, 30, 31].

There is growing evidence of "rapid, dramatic" changes in the fossil record, and this certainly correlates well with socio-political revolutions in human history. Yet much current thinking on Korean integration focuses on a "gradualist" approach necessitated by the lack of cooperation of No. Korea and the fear in the South that "punctualist" here means military attack by the North. But it could also refer to the sudden collapse of order in the North. Didn't the collapse of the USSR occur suddenly relative to our expectations. Those who want to aid in Korean reunification need to be prepared for the contingency of a sudden integration, although most papers I have seen seem to refer to or prefer a gradual integration process [8, 21, 35, 36].

Poisson Populations, Feedback Loops, and Equilibrium

It has been said that the fundamental Korean value is to seek harmony. If so, your country has a noble purpose consistent with much of natural systems history. Most of the IF cycles that are described later result from seeking harmony. When we present the distilled mechanisms of integration that drive the numerous natural systems I&F cycles that follow we will describe several maxims for integration that derive from seeking dynamic equilibrium through feedback.

These are just a few examples of interesting, new, and sometimes counter-intuitive approaches that would be suggested for Korean reunification by systems studies. When taken together they suggest a total systems plan of action than is currently advocated for Korean reunification. This total systems plan will be prefigured in the maxims listed at the conclusion of the paper.

As stated before this section, due to the general nature of systems science the rules are very general and require additional wisdom for

appropriate application. Unfortunately this is a common characteristic of all It should also be noted that progress in modern science and technology has been characterized by counter-intuitive discoveries. When human intuition is not disciplined and corrected by verification procedures as those in science and systems science, errors of human observation and anthropocentrism intrude leading to much past human misery. Consider one example. If all humans understood the long-term power of the lower levels of hierarchies, and acted on this belief and expectation, think how much of human history would have been changed long ago for the better. Dictatorships and monarchies would have been seen as artifacts of human misconception. They would have been recognized as only more efficient in the short-term. They would have been seen as artificially maintained by evil use of force, greed, and corruption. Yet they still continue across our planet.

5. PHYSICAL, BIOLOGICAL, AND SOCIAL SYSTEMS: AN UNBROKEN SEQUENCE OF INTEGRATION AND FRAGMENTATION CYCLES

The purpose of this section is twofold. First, it demonstrates that I & F processes are found in every major natural and human system demonstrating that they are general systems isomorphies of great power. Second, it presents a series of real case studies that can be analyzed and compared in great detail to help *discover the mechanisms* that lead to successful integration and fragmentation. Although this paper focuses on the I-F dilemma in Korea, we feel it is necessary to present this extensive survey because otherwise the integration rules

suggested would be without evidence or context. They would be stripped of their breadth and power, and the audience would be robbed of an important route to understanding their significance. Please appreciate the beauty of, as well as the need for this panorama of I/F change. Note as we progress these very important consistencies: (1) the integration event causes the conditions for the next fragmentation; but (2) the fragmentation event causes the conditions for the next integration; so (3) the I&F are locked in a spontaneous, mutually interdependent, and endless sequence of cycles. Later we will show that the mechanisms causing all integrations are similar at the highly abstracted level of general systems theory.

I-F Cycles in Physical Systems

For a recent, illustrated summary of some of these physical levels of I&F cycles, see [32].

Integration Process: The earliest state in origins of our universe occurred after the Planck timepoint at about 10^{-45} Sec into our current space-time continuum, some 10 to 15 billion years ago (depending on the outcome of current Red Shift debates). At this point the predecessor condition of all of the material of the universe occupied an intensely dense space 10^{-20} times smaller than one of our current atomic nuclei. How this incredibly unified starting condition came to be no one knows. If there is sufficient critical density of matter in our current universe to make the cyclical universe theory correct, then the unified "ylem" or start condition may have resulted from the collapse of a previous universe like ours today (the Big Crunch) where all previous material was integrated into the pre-Planck time and density. These events gave rise to ...

Next Fragmentation Process: The next event is often described as a vast and rapid "explosion" (the Big Bang) when at 10^{-35} sec. the precondition ylem "fragmented" (expanded) to 10^{50} times its previous size and continued to expand until the present day (resulting in the observed red shift and background radiation). These events also caused the separation out (or fragmentation) of the fundamental forces recognized today (strong nuclear, and electroweak forces). This fragmentation event gave rise to ...

Next Integration Process: The rapid expansion caused cooling and dramatic drops in density which allowed the background force field to diminish in successive stages which allowed the spontaneous integration of energy into mass. Thus, appeared successively the level of quark subatomic particle soup at about 10^{27} Kelvin, and the integration of these into neutrons and protons and other hadrons at about 10^{-6} sec.s, and the integration of the first two stable atomic nuclei at from 3 min. to the first 10,000 years of universe history. These joined electrons in the first two atoms of the periodic table, H and He, during the first 300,000 years of the 15 billion year old universe. Still today, 70% of the universe is composed of this primordial H and He. This integration event gave rise to ...

Next Fragmentation Process: But the force of the original Big Bang explosion was still acting on these first tiny pieces of matter sending them far away from each other until they became isolated from each other in a fragmenting event called the "decoupling era" wherein space, matter, and radiation became separated from each other for all the rest of time. This fragmentation event gave rise to ...

Next Integration Process: Gravitational forces acting on the fragmenting material caused vortices of local concentration and

integration that resulted in the formation of several levels of integrating-hierarchical structure, namely, clusters of clusters of gaseous nebulae, clusters within these, and huge superstars within these. This integration event gave rise to ...

Next Fragmentation Process: The implosion (integration) of massive gasses caused the temperatures and pressures to rise within these first generation massive stars to light up with thermonuclear fusion and fission reactions. These explosive reactions would have torn stars apart except for the crushing opposing force of gravitational collapse, but the short-term balance of the explosion forces provided the energy for the next longer-term result. This fragmentation event gave rise to ...

Next Integration Process: Nuclei of the simpler H & He atoms fused (integrated) into more complex and massive atomic nuclei. This process was coupled tightly with fission processes (fragmentation) to achieve stability in the new, more massive atoms. The result was atoms up to carbon in the periodic table. This integration event gave rise to ...

Next Fragmentation Process: These massive stars were relatively short-lived, using up their fuel more rapidly than our star and becoming unstable. The unstable stars expanded rapidly as they switched from chiefly H to mostly He and other atomic fuel. Their size vastly exceeded at this stage their previous size and volume. exploding in vast supernovae that spread their components through local space. This fragmentation event gave rise to ...

Next Integration Process: This exploding (dying) process created conditions because of massive expansion in their outer shells for the origins (integration) of the more massive atoms in the periodic table. This integration event gave rise to ...

Next Fragmentation Process: Ultimately the expanding shell became so unstable that it erupted in a massive supernovae. The 100 or more elements so created by the previous integration were spread across the local nebula. This fragmentation event gave rise to ...

Next Integration Process: Gravitational collapse (integration) of this debris formed smaller, more stable, slower fuel burning, longer lived stars like Sol, and at the same time numerous brown dwarfs, planets, asteroids, and cosmic dust, all highly enriched in higher elements relative to the gasses of the rest of the universe. This integration event gave rise to ...

Next Fragmentation Process: The gravitational force fields intensified because of the presence of the matter and this caused concentrations of these masses in irregular orbits that resulted in vast numbers of probabilistic collisions and very localized explosions. The explosions rendered once integral bodies into their more basic constituents. This fragmentation event gave rise to ...

Next Integration Process: The explosions of the incoming bodies could also be viewed as implosions that caused their more basic constituents to be fused with and to become part of the host body. This integration event gave rise to ...

Next Fragmentation Process: Because of the unpredictable and chance nature of the last two cycles of I&F, these processes created a great diversity of types and sizes and classes of stars, planets, and asteroids, because of the chance local concentrations of gasses and atoms united. This variety-inducing diversity producing effect of the processes we see as a fragmentation. This fragmentation event gave rise to ...

I-F Cycles in Biological Systems

Next Integration Process: A small number of the above diversity of planets (some calculated estimates indicate as few as 1 in 10^8) became "concentrators" (integrators) of a particularly appropriate set of simple inorganic compounds ($C0_2$, H_20, N_2, NH_3, etc.), an appropriate reductionist atmosphere (low oxygen), and just the right balance of internal energy sources (like UV radiation, lightning, volcanic activity). The integration of these ingredients enabled a rare type of interaction leading to biochemical systems. This integration event gave rise to ...

Next Fragmentation Process: The action of the local energy sources blew up the inorganic molecules to their ionic state (fragmentation), spontaneously, at irregular intervals, but consistently over billions of years. Yet oxygen was present in such low quantities at these early times that the C and N were not immediately taken up by the oxygen. This fragmentation event gave rise to ...

Next Integration Process: The action of UV, volcanic heat, and lightning from weather was local, instantaneous, and followed by very rapid cooling. Ions under these conditions spontaneously reunite to satisfy their chemical valences (unpaired electrons in outer shells). The newly integrated compounds formed under these conditions of low oxygen tension favored long chains or rings of numerous carbons and nitrogens. These newly synthesized "organic" compounds were quite different than the "inorganic" compounds from which they came. These results have been simulated many times, by many investigators, in many labs, using many different techniques since their first test by Miller and Urey in 1953. This integration event gave rise to ...

Next Fragmentation Process: Because of the multitude of different

initial conditions, initial reactants, and microenvironments present across the billion years over which this last process happened, an incredibly diverse variety of organic compounds were formed. This diverse taxonomy of types we recognize as a fragmentation process with consistent overall form but branching into an extensive variety of particulars. Origin of life experiments indicate that a greater diversity of amino acids, nucleotides, sugars, metabolites, and small polymers of these monomers are formed spontaneously in simulations than are present today. Sagan estimates that as much as $1Kg/cm^3$ of earth surface was formed over a billion years. This fragmentation event gave rise to ...

Next Integration Process: One of several earth geologic processes (such as early earth freezing, volcanic hot pools, microspheres, micelle formation in the ocean, or coacervates) resulted in very local, very high concentrations of these biochemical subunits. More gentle energy sources and catalysts (such as ocean water-air interfaces and sunlight; clay deposits and evaporation; neutral substrates acting as catalysts) were also present to act on these highly concentrated monomers to gradually favor the spontaneous production of short polymers. This integration event give rise to ...

Next Fragmentation Process: Again, because of diversity of conditions of formation, the diversity of biochemical subunits, and the billion years over which this process occurred, a vast diversity of types of biochemical polymers arose. We interpret such diversification processes as fragmentation processes. This fragmentation event gave rise to ...

Next Integration Process: The origin of the first protobiont or pre-cell by accumulation of a number of "hypercycle-like" (see Eigen [5]) simple reactions in a simpler microsphere, micelle, or coacervate required coordination (integration) of many anabolic and catabolic reactions. This integration event gave rise to ...

Next Fragmentation Process: Again, a very wide variety of these hypercycle containing pre-cells formed over a very long period of time, each competing for the biochemical resources. One of these spontaneously evolved a chemical process linkage between the strengths of ribonucleic acid polymers (ability to replicate, ability to code for multiple copies of protein) which overcame the weaknesses of proteins (inability to reproduce) with the strengths of protein (ability to make large 3D globs that were stable to microforces) to overcome the weaknesses of RNA & DNA (fragile to microforces causing breaks reducing info content). This first "genetic" cell became the basis for all of subsequent biological evolution. This fragmentation event gave rise to ...

Next Integration Process: One could consider the many interlocking sets of metabolic reactions (hypercycles) in the cells of any one species as a finely tuned "molecular" ecology. The gradual evolution of synchrony and synergy of the gene products and their genes in a single genome is an integration. Genome integration happens every time the genes of one species become sufficiently "isolated" from others to maintain dynamically the singularity of that species over time. This integration event gave rise to ...

Next Fragmentation Process: The gradual and sometimes punctuated collection of genetic variation resulted in numerous bifurcations of lineages leading to the appearance of new genomes represented as new species, new genus, new orders, and other higher taxonomic divisions across the last 3.5 billion years. These are

fragmentations into diversity by an originally monophyletic stock. As we have mentioned for previous levels, appearance of a wide diversity of variants on a general plan is considered fragmentation. This fragmentation event gave rise to ...

Next Integration Process: The diverse species thus formed did not live isolated lives, but rather became interlocked themselves in highly integrated local food chains, food networks, food pyramids, and communities characterized by mutually interdependent biotic and nutritional relationships. These communities of coordinated genomes appeared even at the earliest times, 3.5 billion years ago, when the only living systems were procaryotic single celled archaebacteria. This integration event gave rise to ...

Next Fragmentation Process: At about 2.5 billion years ago a revolution in cellular organization occurred resulting in organisms of more than one cell state. By 700 million years ago multicellular organisms appeared with more than one cell type. The development of cells that could transform into many new states and types was a diversification event requiring further fragmentation and specialization of the original cell genome. This fragmentation event gave rise to ...

Next Integration Process: The next level of coordination to appear was the development of ecosystems of many communities called biomes where organisms served specialized and interdependent functions. The adjustment through evolution of the different individual species and sets of species in communities to each other to achieve a much longer term stability is an key unifying event. This integration event gave rise to ...

Next Fragmentation Process: Appearance over time of diverse biomes each adapted to the geoconditions of its continent and

evolutionary history. There also are programmed "successions" between different stages of biome depending on conditions that change cyclically. This fragmentation event gave rise to ...

Next Integration Process: The next step was the coupling of geological mechanisms with ecological mechanisms resulting in a biosphere that is able to maintain its dynamic equilibrium and cycles through feedbacks and opposing influences acting between the geo- and bio-components. This is the popular concept of GAIA championed by scientist like Lovelace and Margulis. The much longer term stability caused by GAIA or large biomes allowed some of the multicellular species to develop larger brains through enrichment and enfolding of ever larger quantities of neurons. The gradual evolution of the brain until consciousness emerges as a new quality was actually a very long, successive series of integrations and fragmentations in itself. This integration event gave rise to ...

Next Fragmentation Process: Awareness and accumulation of more and more information resulting in the diversification of transferable neural nets (memetic development; taxonomies of memes; their diversification). This marks the transcendence from biological to sociological systems and the link with the social system cohort of I-F cycles described next.

I-F Cycles in the Social Systems Domain

Next Integration Process: Suites of integrated behavior began to reinforce each other and eventually give rise to each individual culture or religion by enfolding of accumulated memes. This gradual development of boundaries resulted in further isolation and internal elaboration of connections. This integration event gave rise to ...

Next Fragmentation Process: Diversification into a multitude of cultures by accumulation of variety led to a world history with many integrations and fragmentations for which we are both observers and participants. As we leave the above vast survey of natural systems, we will also leave our method of proceeding by alternating I&F events. Social systems with their greater diversity have many foci of action around the world at the same time making it difficult to trace linear I&F events. So, from here on we will just select 4 representative case studies of I&F cycles that illustrate I&F in human history and the evolution of the human knowledge base:

Human Language as Integration and Fragmentation: When the many languages of the world are compared using general semantics, relationships are found and verifiable lineages and clusters are discovered. The "taxonomic" tree so derived looks similar to the "tree of life" and origins of species. The clusters of branches or "trunks" are evidence that isolated geographic concentrations of people share the same phonemes, grammar, alphabet, and vocabulary and these bind them together (integrate their society). That many branches share the same trunk demonstrates that long diverged languages still show remnants of their relationship; that they were all derived from the same forerunner. The many branches off each trunk indicates that after any one language appears it collects variations and sometimes diverges from other languages. The modern experience of "dialects" within one language is evidence of this. New Guinea is an island; yet over 7,000 dialects exist there. The nine main trunks of the hypothesized Proto-Indo-European language originating ca. 1,700 BC is spoken today on all continents and half the worlds peoples. Another major trunk is the AfroAsiatic protolanguage. Even today languages are "living;" they

serve both the function of unification (integration) and the function of diversification (fragmentation) simultaneously. Those who share language are bonded together by the same attributes of the language that separate them from others.

Empire Building throughout Early Civilizations: For a recent, illustrated summary of some of these civilizational levels of I&F cycles, see [16]. Discussions of the appearance of large- scale social systems (that is city-states, states, nations, and empires) must distinguish between two mechanisms of integration, within and without. Sometimes cultural and economic hypercycles spontaneously arise from within at the lower levels of the social hierarchy and account for the rise of a civilization. Sometimes a conqueror from without at the upper levels of social hierarchy unites a diverse set of cities or nations by aggression. Toynbee tried to document the many cycles of rise and fall of civilizations in world history [38] according to a fundamental process of "challenge and response." Both the challenge and the response for the origin of new civilizations are here taken to be special cases of a more universal integration process. (Incidentally, although he showed a clear understanding of the relation of the cyclical rise and fall of civilizations to the ancient Yang-Yin principles, I do not agree with his conclusions concerning the inevitability of a universal state without ensuing fragmentation. I consider this unrealistic idealism unsupported by evidence). For evidence of I&F cycles in society, consider the following empires which were integrated by armed aggression or internal spontaneity and fragmented after a leader or dynasty died out, or passage of time led to the gradual internal decay of natural, moral, or genetic resources: the Egyptian Empire (ca. 3,100 BC to 50 AD);the Shang, Chou, Ch'in, and Han Empires alternating with feudal periods

and the Epoch of the Warring States (1500 BC to 250 AD) represent several I&F cycles; the Asoka and Gupta Indian Empires alternating with separated city-kings (300 BC to 535 AD); the Persian Empire (560 BC to 330 BC); the Empire of Alexander the Great and his father Philip (360 BC to 323 BC) which decayed quickly in the wars of the Diadochi after his death; the Roman Empire (509 BC to 476 AD) which experienced several alternating periods of I&F. Or you might consider as evidence of I&F Cycles more modern examples such as the Austrian Empire, the British Empire, the history of colonialism, etc. Hidden in these vast events of world history by aggression are the humbler amalgamations that result from people at the lower levels of the hierarchy binding together with other peoples because of common needs or interests. These integrations are by far the longer lasting, and it is to these fundamental integrative groups that the larger empires always return to by fragmentation. The lesson for Korea is *Rule: If you wish to achieve the most stable and lasting unification, always seek to establish an integration using binding at the lowest levels of the social hierarchy.*

Religions, Yesterday and Today: Toynbee stated that religions do not fit into the same patterns of rise and decline of civic states, but represented a new phenomena that was extra-national, and extra-empire [38]. Clearly their influence is inextricably tied to social systems. Consider the impact major religions are having today on politics. Their influence easily crosses national and international lines with everything ranging from terrorism to compassionate ministry. When abstracted to the level of I&F cycles though they exhibit the same patterns as any large system. Each religion itself has experience multiple periods of integration and fragmentation that continue up to modern times.

Christianity began with a series of violently competing sects until the First Council of Nicea, convened by my ancestor Constantine the Great in 325 AD, resulted in a dominant sect and dogma, and the conversion of the church so formed from the persecuted to the state religion. It is ironic that historian Gibbons attributes the ultimate fragmentation of the otherwise longlasting Roman Empire to the undermining of Roman virtues by this very state religion. The Protestant revolution was another period of fragmentation with subsequent integrations experienced by Christianity. Islam has many factions, often with considerably different agenda and goals. There have been many fragmentations of Buddhism even though it tends to be less dogmatic and more inclusive than western philosophies.

Integration of Scientific Theories: I&F cycles do not occur just in the realm of physicality; they also occur in the realm of thought. All of science can be seen as "regular" science resulting in the accumulation of more and more facts (fragmentation) and their eventual synthesis into new theories which unify and explain a wide diversity of previously unsynthesized facts. Evolution accomplished this for zoology and botany. Continental drift theory for geology. Biology itself is an integration with DNA and genetics an integration on the integration biology. Physics is a good example of historical theoretical integration. Forces, formerly thought to be unique and different, were eventually discovered to be unified. Electricity and magnetism were found to be different forms of the same energy in the early eighteenth century and rapidly thereafter in the nineteenth and twentieth these were joined by the strong and weak nuclear forces, until physicists project all will be joined into a unified field theory.

We will let these few examples prove the point that integration and

fragmentation processes are found in virtually every known large scale system including physical, biological, and social systems. This universality argues for their status as isomorphies. They are processes fundamental to the success of any system.

6. LEARNING FROM A MULTITUDE OF HISTORICAL EXAMPLES OF INTEGRATION AND FRAGMENTATION

Natural Systems Science As A Teacher

We do not usually look to natural systems for advice on how to build better social systems, but perhaps we should given the following 5 arguments. (1) All "systems formation" or "systems origin," whether natural or social, is a matter of the spontaneous and vary gradual formation of regular patterns over very long periods of time, in a multitude of entities, undergoing a vast number of trials. Natural systems have engaged far greater numbers of entities than social systems (numbers beyond 10^{53} compared to 10^{9}), over longer periods of time (10,000 years vs. 15 billion), and through a much greater number of trials (unimaginable number). We maintain that natural systems are more "mature" in their exhibition of ideal systems structure and process due to these differences. (2) Natural systems are not anthropocentric. Natural systems cannot project purpose and consciousness, superstition, ambition, greed, self-centered egotism, conceptual errors, dogmatism, etc. on their manifestations or productions. (3) When we observe natural systems we are much further removed from them making it easier to sense large-scale patterns from an abstract distance. (4) Natural systems are more measurable and the

patterns we think we see in them more falsifiable to act as a guarantor of the reliability of what we sense. (5) Because of the large numbers involved in patterns of natural Systems we can use mathematics, statistics, non-equilibrium and chaotic analyses to find otherwise obscure patterns. None of these advantages can be found in social systems.

General Similarities Between Natural & Social Systems

Some argue that social systems are so uniquely different from natural systems, that one could not be used to learn about the other. They cite the "gaps" between inorganic and organic, between non-living and living, between non-conscious and conscious, between soul-less and soul-bearing. Yet, as the unbroken sequence of I&F cited above begins to show, modern science has closed many of these gaps with tested continuities of change. The inorganic gives rise to the organic, the non-living to the living in seamless ways. Further, systems science looks at all of these particular manifestations of entities at the generalized level of systems arguing that at that highly abstract level they have significant similarities, while completely different and unique in particulars. It is striking how close this old hypothesis of general systems theory is becoming to the gauge symmetry of modern quantum physics and search for the unified field theory [32].

7. INTEGRATION & FRAGMENTATION AS YIN/YANG ISOMORPHIES

Coupled Cycles of Integration and Fragmentation

The alternating I&F events in many different natural and biological

systems across billions of years just cited indicates that I-F Cycles are about the most fundamental manifestation of dual and opposing processes ever discovered. The Yin-Yang general form of opposing duality has been known, of course, in Asian culture since ancient times. A fragmentation is an integrations' way of making another integration. An integration is a fragmentations' way of making another fragmentation. Much as we humans fear and disparage the generic fragmentation process because we recognize it as destruction, disorganization, and disintegration, it is vital to what we treasure the most. Fragmentation enables integration. Much as we humans rejoice over and celebrate the latest integration, we must be ready to accept and even welcome the fragmentation that will inevitably follow it as night follows day. This provides an overriding philosophy and ethic that for some may ease the pain of the Korean (German, Russian, etc.) reunification efforts.

Which is the Dominant Process

Study of the I&F processes across the many cited natural systems would seem to indicate that neither is dominant since each creates the conditions for the other as in classical Yin-Yang dualities. However, closer analysis seems to indicate that fragmentation is the more entropic, and so more probable process because it requires less energy and proceeds more automatically. Integration would appear to require more energy, and even in natural systems does not occur until a long build up of fragmentation energy or "potential" makes the next integration inevitable. Then the integration, once underway, often leads to a new order of things which decays by fragmentation or diversification. The lesson for conscious human systems is clear. *Rule:*

Human integrations require the accumulation of considerable "potential energy" as they must proceed opposite the natural tendency for fragmentation. They require maximum total systems planning to proceed at all and to be successful must establish a new order of interactions that transcend previous states.

8. IDENTIFICATION OF KEY NATURAL SYSTEMS MECHANISMS THAT STOP INTEGRATION AND PROMOTE FRAGMENTATION

Comparison and analysis of the wide range of natural systems I&F events cited above helps us recognize a series of *universal* mechanisms active on all levels that inhibit integration. These mechanisms can become obstacles to Korean reunification and the total plan for reunification must contain specific plans to counteract all of these mechanisms at all levels. Anything less will lead to some of the same difficulties encountered in unification of Germany [3, 28, 34, 46], and additional ones peculiar to the Korean problem. Here we will mention these only briefly since they are so general in form; we will follow with a more specific obstacles analysis for Korea.

On Hypercycles and Hierarchies: [see 5 & 41]

The origins of subatomic particles, of stars, of the protobionts (first cells), and many other natural systems origins cited above were due, in part, to the spontaneous formation of new hypercycles. Hypercycles are interlocking dependencies that are characterized by outputs which lead to increased probability that the inputs creating those outputs persist

and expand. But once these newly emerged levels of the natural hierarchy were established, they tend to diverge because of the formation of different types of hypercycles within the new level. These new types lead to a hierarchical taxonomy of types, a diversification that we characterize as fragmentation. The same thing happens in human affairs; social systems form from hypercycles, but also differentiate due to hypercycles.

Despite its current situation as a declining power, No. Korean society has established many unique socialist-based hypercycles that distinguish between the two Korea's. Although this is an obstacle because its hypercycles are so different from those of the South that they do not allow interactions, it is also a potential point of weakness of the North and of strength for the South. The reason for this derives from a systems analysis of the proximity of the hypercycles with general economic and systems dynamic fundamentals. The Southern hypercycles have their component foundations much closer to general economic and systems dynamic fundamentals, while those of the North are very distant from true economic and systems dynamic fundamentals. This has not often been exposed. The hypercycles of the North are mainly socio-political hypercycles. Both their components and the flows between components are comprised exclusively of socio-political entities and are relatively isolated from realistic socio-economic and systems dynamic fundamentals. By contrast, the hypercycles of the South are based on and include mechanisms important to all natural systems (namely, competition, limits, natural selection, energy costs, stochastic planning, etc.). As such they have a hierarchical base of natural systems that support and renew the social system. Socialist hypercycles establish unnatural and non-maintainable

hierarchies because they are totally anthropomorphic. Over the long-term such hypercycles, divorced from their base, must rely more and more on artificial authority and externally imposed discipline, and they use-up resources. *Rule: Study specific ways that socialist, anthropomorphic hypercycles can be altered ta include fundamental natural systems processes.* More conscious expositions of the blind alley this socialist type of anthropomorphic hypercycle leads society into might help others turn away from such systems and remove this obstacle. Which leads to another *Rule: Devise ways to transform every specific obstacle to integration into a promoter of integration by making it into a performance specification and reversing its effects.*

New Boundary Conditions from Autopoietic Closure

When interactions or flows between parts becomes sufficiently intense, as in genes in a genome, metabolites in a cell, gravitationally imploded hydrogen and helium in a star, etc., the result is a spontaneous internally caused closure or boundary between that entity and others. This boundary is a fragmentation event that gives definition to individual entities at whatever level. No. Korea has established a number of specific boundaries that separate it from the South; in fact, it has consciously recognized this process and raised it to the level of an internal philosophy, i.e. "juche." But every such boundary condition in natural systems is based on real limits and potentials of the components in lower levels of the hierarchy. "Juche," by contrast, is based on needs of the higher, not the lower levels of the hierarchy. As such they cannot persist indefinitely, but are doomed to eventual collapse. The South may hasten such collapse by seeking every possible way to gradually increase the influence of the lower levels of the hierarchy to express

their own interactions and linkages, which will cause readjustment to a more natural boundary condition and internal closure. Notice this leads to the same rule as one expressed in the integration mechanisms section later; *Rule: If you wish to achieve the most stable and lasting unification, always seek to establish an integration using binding at the lowest levels of the social hierarchy.*

Intense Positive Feedback Loops

The above cited origins of stars, cells, philosophies, etc. all had as a part of the hypercycles, comparatively intense feedback loops. These positive feedbacks cause an exponential increase in growth and survival response to perturbations that threaten a system. When one analyzes the feedback loops within the No. Korean society, one would find an absence of positive feedback loops between the upper and lower echelons, as well as between the lower levels of the hierarchy and their physical needs or use of resources. Without such positive feedbacks growth and response is halted completely and so is adaptation and stability of the system. Most of the positive feedbacks in socialist or communist countries are artificial. They focus on the upper levels of society and the rules it creates which are designed for the artificial result of keeping those in power, in power. Notice that such a set of rules must decay over time as the needs of the economy, the people, the relation between production and resources, and the need for innovation and competition become more and more out of tune with the artifice of the social rules, which are divorced from realities. This leads to another possible approach for Korean reunification. *Rule: Use all possible means of scholarship to expose and communicate widely the very poor systems design principles that typify, current centrally planned*

economic systems.(particularly inappropriate or missing + and - feedback loops). The more widely these shortcomings are known, the more pressure there will be for alterations in their system, and the more attention will be paid to other obvious shortcomings in the current capitalist system.

Negative Feedback and Feedback Delays

One would also find a serious absence of negative feedback loops, or an unusually long delay for their signals in No. Korean society. Negative feedbacks there are designed as punishments to ensure no communication with the outside world, no deviation from state policy, in fact, no use of negative feedbacks that act on those in power concerning lack of progress in their society. Negative feedbacks are also missing in capitalist society except the delays and the absent loops are different in the two societies leading to two different types of systems pathology. *Rule: Increase open communication between the two societies because this will unleash the natural negative feedback potential in the polity. A wide range of measures should be taken to help open communications provided the threat to the current power structure is deflected in clever ways using secrets from IF cycles of the past.*

Systems Theory of Emergence

The I&F cycles that are described in the following sections result in a continuous hierarchy of systems levels from the physical to the mental. On each level new qualities appear. This phenomenon is called emergence. Like the anthropomorphic concept of thesis: antithesis: synthesis, the new levels transcend the qualities and limits of the former

levels. Several systems design principles act together in the origins of these new levels of system. It is important that Korean efforts at reunification point equally at shortcomings in both systems to give some sense of neutrality to the effort at joining both systems. *Rule: The effort for integration should be presented as emergence of a new type of system that transcends both the shortcomings of capitalist and socialist systems.* In this way, the effort at reunification will appear more neutral, and the will to accomplish it can be used to improve capitalist society and socialist society simultaneously. If this is achieved in Korean reunification, then your society would make a lasting contribution to world history as most other integrations have simply replaced one known system with another, not devised a "hybrid" systems having the best of both and more.

Relative Linkage Emergies

The emergy (embodied or emergent energy) calculations of H.T. Odum have clarified and unified calculation of the "costs" of new levels of the hierarchies of various natural and social systems in terms of the emjoules (solar energy equivalents) necessary to build the new levels of systems. This has allowed a consistent metric for comparing the relative costs and stability's of diverse systems and earned Odum the coveted Craaford Prize from Sweden. In all of the literature available on integration of a United Korea, I have not seen any estimate or calculation of the energy and economic savings that would be accomplished in the long term by uniting the warring factions. The cost of achieving integration (est. at $1 trillion) should be compared with the money and resources saved by reunification over a three generation period (60 years). *Rule: Motivate more will for reunification by estimating energy and economic savings and likely increases in quality of life for what numbers of people.*

Several other fragmentation processes such as entropy decay, failure of replicating mechanisms, recombination/permutation mechanisms, action of the exclusion principle, energy or information influences of external potential fields, and action of the principle of plenitude are not discussed here for sake of brevity.

9. SYSTEMS-BASED OBSTACLE ANALYSIS

Applied research at our Institute indicates the most successful interventions begin with a total systems plan that pays careful attention to predicting every possible obstacle that could inhibit systems success. It is clear from several studies that a consistent deficiency in German reunification was lack of total systems planning and willful ignorance of potential obstacles [3, 28, 34, 46].

Obstacles that might interfere with Korean reunification may be clustered into those pertaining to one of four domains: political subsystems, economic subsystems, social subsystems, or the total system as a whole. Many of the following 31 obstacles were identified in an analysis carried out at our Institute for Advanced Systems Studies by Coln. Suk-Won Kwon during a year of study in the U.S. with a few added from our own studies since [18].

Political Subsystem Obstacles

These political-military forces inhibit Korean integration: (1) hegemony and inflexibility of current political leadership in No.; (2) Corruption of capitalist leadership in the So.; (3) existing privileges of

very large standing No. Korea military; (4) out of proportion military budget in No.; (5) expected wide unemployment of military after integration; (6) vast commitment of military hardware and infrastructure to aggressive military intrusion into So.; (7) mutually exclusive laws and constitutions of both No. and So. regarding each other; (8) further clandestine development of nuclear forces; (9) past military and political agreement and contribution of external countries (China and re-emergent USSR for No. and U.S. for So.); (10) competition between No. and So. for new agreements with external countries without participation of the other Korea.

Economic Subsystem Obstacles

These economic forces could inhibit Korean integration: (1) the "juche" philosophy which emphasizes no interaction or joint ventures with S. Korea or other economic partners; (2) the cost of a social welfare program adequate to support N. Koreans until able to themselves; (3) expected wide unemployment in No. and probable spill-over to So. after integration; (4) expensive costs of improving No. Korean infrastructure (roads, communications, bridges, ports, railroads, etc.); (5) proven low productivity of socialist workers after encounter with capitalism (1:10 difference in productivity No.:So.); (6) Lack of aid by So. Korean partners given increase in need with integration, and complete loss of aid by No. Korean from communist and former communist neighbors; (7) overall cost of reunification for So. with estimates ranging up to 5 times total GNP, nearly a trillion dollars; (8) frustration with lack of success of early joint ventures by No.. (9) the disproportional amount of money spent on military systems (ca. 1991 about 5% of the GNP for the So. and 21% of the GNP of the No.)

which could be better spent on improving the economic fundamentals of both.

Social Subsystem Obstacles

These socio-ethical forces may inhibit Korean integration: (1) differences in motivation for unification between older and younger generations of So. Koreans; (2) old hatreds and pain from the Korean War; (3) historically proven difficulty of socialist-raised persons to adopt capitalist mores and viewpoints; (4) tendency of capitalist social systems to experience increases in crime and the distance between have and have-nots; (5) no religion in No. vs. religious freedoms in So.; (6) concept of competition and self-responsibility (on your own vs. state-supported); (7) different purposes and methods of educational systems; (8) completely different attitudes of press and communications; (9) a larger Korea will paradoxically experience increased internal forces for fragmentation (cf. current forces for fragmentation in So. Korea alone given its relative homogeneity).

Systems Environment Obstacles

Any social system exists within the "nest" or context of many other countries and is influenced by international pressures. Some of the major pressures on Korea which might inhibit integration are: (1) negative reactions of communist countries (China, Vietnam) over further dissolution of socialist systems; (2) negative reactions of surrounding capitalist countries worried about increased economic competition from a united Korea; (3) fear of nuclear power development in either No., So. or reunited Korea.

The existence of 31 or more obstacles to integration might

discourage any reasonable polity from even attempting reunification. But the above cited obstacles must be balanced by citation of the forces that favor integration as described next. Further, this detailed analysis of obstacles should be viewed as the source of a very detailed set of performance specifications for building a successful plan for integration. This transforms the obstacles into a positive rather than a negative role.

10. IDENTIFICATION OF KEY NATURAL SYSTEMS MECHANISMS THAT PROMOTE INTEGRATION AND INHIBIT FRAGMENTATION

Comparison and analysis of the wide range of natural systems I&F events cited above also helps us recognize a series of *universal mechanisms* active on all levels that promote or accomplish integration. We can use these mechanisms to suggest general rules to help plan, initiate, and maintain Korean reunification. This section combines these *universal mechanisms* with a systems-based analysis of 25 forces favoring reunification (to balance off the 31 obstacles) to provide more rules for social systems integration from study of natural systems integration. Again, the total plan for reunification might contain specific plans to enhance all of these integration mechanisms at all levels.

Significance of "Dynamic Binding" for Korean Integration

Notice that the "liet motif' of all I&F above were the coupling, linkage, or binding of formerly independent parts. Quarks bind into

nucleons into atomic nuclei into the elements into inorganic compounds into organic compounds as monomers into biopolymers into metabolic hypercycles into organelles into cells into tissues into organs into organ systems into organisms into behavioral units into societies, into empires, into civilizations, etc. The binding usually occurs at the n-l or lower levels of the hierarchy and happens spontaneously according to the natural tendencies of the entities of the previous level. The strength of the binding relative to the standing field energy of the environment of the bound entities is critical at all levels we cited. Covalent bonds are significantly stable yet dynamic on earth but not in very high energy environments. The bonding between subatomic particles is very strong but were not stable until after the universe had expanded and cooled significantly. They were not possible before that time. Another way for things to "bind" is to be ordered in a temporal sequence of influence. All of these features may be used to devise strategies for integration at any level. *Rule: Identify and enhance all possible "attractions" between entities to be bound (at all levels, classes, and domains of both So. and No. Korean society). Rule: Reduce the disruptive influence of the surrounding systems environment on the classes and types of anticipated bonding between entities (in the United Korean society).* Notice also the use of the word "dynamic" in the title for this integrative mechanism. It refers to the preferred quality of binding; that it be strong enough relative to the environment to be stable, but that it also be changeable enough that it create an integrated entity that is capable of change. Clearly certain social systems have bound their citizens to them in ways that do not allow the flexibility and dynamics to adapt to new and changing conditions around them. Capitalist societies have turned out to be much more dynamic, flexible, and

adaptive to new conditions than predicted by Marx. *Rule: Create bonding classes that balance the opposing needs for stability and change to allow for future adaptation and evolution of the bonded entities.*

Some of the specific forces now active in Korea related to this systems integration mechanism which would promote unification include: (1) So. and No. share language; (2) So. and No. share early histories and traditions; (3) So. and No. share ethnicity, genetic propensities, and gene pool; (4) So. and No. have more than 10 million separated families that wish to reunite. All of these forces could be used to bind a United Korea together and keep it stable.

Significance of "Shared Need or Necessity" for Korean Integration

When the binding potential acts to bring things together in the I&F cycles cited above, it creates a field of possibility I visualize as a new "potential field" that describes a general bodyplan (Weltannplan) [43]. This field encompasses all possible deviations on the basic plan for that new set of objects. Nature, following the principle of plenitude, then usually fills all the possibilities over a long enough period of time. For example when the quark soup was stable as the universe cooled, 8 stable quarks appeared, and later 200 subatomic particles, and still later 100+ elements that were relatively stable. All the variants that appear on a level are built on the same bodyplan, but have differing elements of the total bodyplan present or lacking. This creates the potential for bonding (described above) because the bodyplan has parts missing. I call this "shared need" because any particular entity is incomplete without the missing part, and "necessity" because it must have the

missing part to become stable in the long term. If all of the variant entities were not produced from the same universal conditions they would not share the same overall bodyplan and therefore not have extra or missing parts that complement each other. So nature, in producing the variants at a particular point in natural history, is also producing at the same time the potential for the next level of aggregates. This leads to the following integration Rule: Identify "shared needs" due to incompleteness and create ways to fulfill that need that promote integration. *Rule: Create variants that mirror each other in overall bodyplan, but are stochastic variations of missing and extra parts of that bodyplan.*

Some of the specific forces now active in Korea related to this systems integration mechanism which would promote unification include: (1) the No. needs the grain production of the So.; (2) the sense of Korean identity, historical unity, and destiny is unfulfilled until the Korea's are one; the people's will wants this unification; (3) the So. could use the extensive natural resources of the No.; (4) the No. needs the capital and direct investment of the So.; (5) No. needs technology of the So.; (6) the will exists in many politicians and business corporations for unification; (7) both No. and So. need to feel more secure without threat from the other; (8) the No. needs the perspective of the So. on the shortcomings of communist society; (9) the So. needs the perspective of the No. on the shortcomings of capitalist society (note the recent disenchantment of migrants from the No.).

Significance of "Exchange Between Parts" for Korean Integration

The potential for binding and the shared need creates the tendency

for exchange. In all of the natural systems I&F cited above, matter, energy, or information were exchanged to accomplish an integration. Quarks are said to exchange gluons, atoms exchange electrons, gravitational energy creates stars, galaxies and clusters of galaxies, organs exchange hormones, neurons exchange stimulants and depressants, humans exchange information, so do most societies. This is the most difficult part of the Korean reunification problems due to "juche" which effectively cuts off No. Korea from any exchange at all. So essential is exchange that general systems studies would place a high value on promotion of subtle, clandestine, or even uneven exchanges to at least get these flows underway. *Rule: Promote every possible type of exchange being cautious to ensure that exchange, not giveaways occur. Integration through binding happens only when there is a vital exchange of something, while one way flows may actually result in the opposite of binding.*

Some of the specific forces now active in Korea related to this systems integration mechanism which would promote unification include: (1) the combined Korean society could more effectively use the rich, untouched natural resources of the Northeast (exchange of materials); (2) the So. needs to find innovative ways for the people of the No. and So. to communicate directly (exchange information); (3) the So. could use the labor force of the No. (people exchange); (4) recent "joint ventures" law of No. (exchange of capital); (5) exchange of learned know-how in creating private enterprises.

Significance of "Subsumption: Parts into Wholes" for Korean Integration

The survey of integrations and fragmentations across physical, social, and biological systems showed an unbroken sequence of subsumption as well as emergence. One is the flipside of the other. In every case the new whole was created from the former parts. Cells seem to act independently, but those in our body are obligate parts. Still they profit from the increased stability, protection, and complexity that comes from being part of a body. They also contribute to achieving emergent possibilities far beyond the capabilities of a single cell. This amplification of potential is true of any of the parts that combine to make wholes. Could we promote such an attitude widely among the Korean people? Would this development increase support for integration in those populations (e.g. the young) who seem less interested in integration. *Rule: Create and clearly publicize the benefits that accrue to "parts" willing to be subsumed into the whole.*

Some of the specific forces now active in Korea related to this systems integration mechanism which would promote unification include: (1) offer some kind of creative guarantee of no loss of high level positions upon unification because leaders do not like to be subsumed; (2) promote idea that a United Korea could join the international family of nations in the U.N., a larger wholeness; (3) spread concept of a new, unified Korea as a much greater, hybrid entity that is more glorious to be part of than to be smaller though independent; (4) appeal to the idealism and energy of youth so they will adopt the great task of unification as a goal worthy of their generation.

Significance of "Reduced Energy" for Korean Integration

In many cases of the I&F cycles cited above the main driving force for accretion or bonding for aggregation was that the bound entities, the larger complex, actually required less energy than the free entities. In

physics and astronomy, the ever larger aggregates of matter in our universe could not form until the energy level and density of the university dropped below a critical point. In biology, autocatalysis is a similar phenomenon, as in assembly of massive microtubules from single tubulin unit proteins. The clathrate organization of water molecules surrounding the single proteins requires more order than that surrounding the assembled proteins. Thus energy is saved by assembly and so the assembly happens spontaneously. So another integration strategy requires we obey entropy, that is, things come together most easily when their fusion is the pathway of least effort. *Rule: Create plans economic sector by economic sector, population cluster by population cluster that can be shown to minimize total system investment per unit of productivity or unit of increase in quality of life (in won, energy, manpower, etc.).* Compare and evaluate the costs and benefits for integration of each hierarchical subdivision to judge whether or not the pathway to the integration of each cluster will lead ultimately to savings in effort. To make this comparison it will be necessary to follow the total system changes over at least three generations. This kind of study is difficult to perform. Our Institute sometimes substitutes "next step" or "next cohort of steps" studies to reduce the investment and time required for the comparisons.

Some of the specific forces now active in Korea related to this systems integration mechanism which would promote unification include: (1) The combined Korean society could reduce military expenditures dramatically (ca. 1991 by nearly $15 Billion) and still provide for adequate defense of the Korean homeland; (2) the No. needs the reputation for stability and reliability of the So. political and economic system; (3) reduced need for U.S. forces in Korea saves both

money; (4) higher productivity of the United Korean peoples creates wealth, part of which goes to the integrated government; (5) higher prosperity for the United Korean people creates stronger internal markets whose trade within and without the country reduces the energy proportion needed for maintenance.

Significance of "Coordination in SpaceTime" for Korean Integration

For material, energy, or especially information to be exchanged, the actions of many parts have to be coordinated or controlled in space, time, and dimension. Otherwise exchange cannot occur and so binding and integration would break down. *Rule: Be ready with a total systems plan for integration in case a "punctuated" or sudden decline occur in No. Korean stability.* Several commentators on the Korean unification problem have suggested gradual process of integration, probably due to the lack of will and cooperation for integration on the part of No. Korea, and the danger of instability caused by rapid change. However, it should be noted that there are several dangers to proceeding gradually as noted from past experiences in cases like Germany [3, 28, 34, 46]. Observers note that the will to unite may diffuse over time, and that the collapse of socialist governments in the past have most often happened very quickly and unpredictably because the central governments in those cases resist change until pressure for change increases exponentially. It is likely that this will be the case with No. Korea and readiness is a paramount to success. *Rule: Several total systems plans should be prepared each predicated on a different set of contingencies.* Who will be in charge of creating the details of a total systems plan for Korean integration? Governments are not known for their total systems

planning. We can suggest three groups outside of the current No. and So. Korean government: (1) Private organizations such as professional societies, like the Research Institute for National Unification (RINU); (2) International organizations promoting Korean reunification such as those with worldwide websites [23], and (3) public and private university departments in politics and ethics studies like those sponsoring this conference. This issue is too important to be left to the established governments or political philosophies.

Some of the specific forces now active in Korea related to this systems integration mechanism which would promote unification include: (1) the "timing" for reunification is propitious because of modernization in China, collapse of the USSR, and a flurry of integration attempts worldwide; (2) Korea should unite now or lose its long-term competitiveness with other rapidly expanding southeast Asia economies; (3); (4); & (5) the activities of the three groups mentioned above.

Significance of "Increases in Magnitudes" for Korean Integration

If you compare the many levels created by I&F in natural systems cited above, you may note a progressive increase in size, stability, and relative complexity. Although these may be considered the result of integration, they are actually also the cause for each integration cycle in natural systems. Without increases in stability at the higher levels, the lower levels of a hierarchy are not possible. Likewise the higher require the lower. In this sense the stability of the entire set of hierarchical levels creates the environments for the lower levels. They coexist and are codependent for maximum mutual stability. The survival of many of

the physical, biological, and social systems of today are due to their increase in size, information complexity, and dynamic equilibrium relative to their environments. *Rule: For each economic sector or population cluster seek to establish the maximum number of connections with entities within the unified country and with sectors or clusters in other countries to achieve the maximum operating size of each sector or cluster.*

Some of the specific forces now active in Korea related to this systems integration mechanism which would promote unification include: (1) A United Korea would have more defensible boundaries with more than double the territory as before (roughly 100 km^2 each to 225 km^2); (2) it would enjoy a significant increase in manpower; (3) it would have eliminated the most threatening and proximal forces that could act against its stability; (4) it would have broadened its relationships with a much wider range of other nations in the world, making it part of the international political network; (5) it would have greatly expanded and stabilized its active trading partners, and so markets for its products.

11. A COLLECTION OF SUGGESTED REUNIFICATION PROPOSITIONS OR MAXIMS FOR TOTAL SYSTEMS PLANNING

Caveats: The text of this talk mentions specifics on the Korean reunification problem for each of these general Maxims without which they here sound so general they could be applied to any problem. They are collected here as a set of Maxims from general systems studies much like Sun-Tsu devised a set of general Maxims for warfare, or

Machiavelli for maintaining the prince's power. In the paper's text we remind the reader that applying general Maxims to particular circumstances is as difficult as discovering the general Maxim in the first place. There are no simple or final answers for a problem as complex as Korean reunification, and these Maxims are meant to stimulate thinking, planning, and discussion. Finally, please remember that the text states clearly that these were meant to be applied as a full set and are weak if attempted singularly.

1. Maxim: Focus an improving the lowest levels of the hierarchy in North Korea to improve the total system for the longest term.

2. Maxim: Discover empirical criteria for identification af the most naturally occurring improvement clusters (sectors) in North Korea.

3. Maxim: Devise unique plans for each identified natural cluster in North Korea.

4. Maxim: To encourage integration of a new hierarchy, you must enable a new network of interactions within the infrastructure.

5. Maxim: New hypercycles can only replace older hypercycles if the new hypercycle is orders of magnitude better ar more efficient than the old.

6. Maxim: Develop the basics of the No. Korean new social system as an improved network of hypercycles apart from the old No. Korean social system.

7. Maxim: Extensive training and acclimation programs must be initiated before any particular natural No. Korean cluster is financed for assimilation, or So. -No. cluster for cooperation.

8. Maxim: Identify and use the forces of each cluster or level of the natural hierarchical age pyramid to enhance participation of the whole

population. This will require separate age-level analyses for South and North.

9. Maxim: Human integrations require the accumulation of considerable "potential energy" as they must proceed opposite the natural tendency for fragmentation. They require maximum total systems planning to proceed at all and to be successful must establish a new order of interactions that transcend previous states. Otherwise decay will outstrip the planned integration.

10. Maxim: Study specific ways that socialist, anthropomorphic hypercycles can be altered to include fundamental natural systems processes.

11. Maxim: Devise ways to transform every specific obstacle to integration into a promoter of integration by making it into a performance specification and reversing its effects.

12. Maxim: To achieve the most stable and lasting unification, always seek to establish an integration using binding at the lowest levels of the social hierarchy.

13. Maxim: Use all possible means of scholarship to expose and communicate widely the very poor systems design principles that typify current centrally planned economic systems. (particularly inappropriate or missing + and - feedback loops).

14. Maxim: Increase open communication between the two societies because this will unleash the natural negative feedback potential in the polity. A wide range of measures should be taken to help open communications provided the threat to the current power structure is deflected in clever ways using secrets from IF cycles of the past.

15. Maxim: The effort for integration should be presented as emergence of a new type of system that transcends both the

shortcomings of capitalist and socialist systems.

I6. Maxim: Motivate more will for reunification by estimating energy and economic savings and likely increases in quality of life for the people.

17. Maxim: Identify and enhance all possible "attractions" between entities to be bound (at all levels, classes, and domains of both So. and No. Korean society).

I8. Maxim: Reduce the disruptive influence of the surrounding systems environment on the classes and types of anticipated bonding between entities (in the United Korean society).

19. Maxim: Create bonding classes that balance the opposing needs for stability and change to allow for future adaptation and evolution of the bonded entities.

20. Maxim: Identify "shared needs" due to incompleteness and create ways to fulfill that need that promote integration.

21. Maxim: Create variants that mirror each other in overall bodyplan, but are stochastic variations of missing and extra parts of that bodyplan, a condition which promotes binding.

22. Maxim: Promote every possible type of exchange being cautious to ensure that exchange occurs; one way flows result in the opposite of binding.

23. Maxim: Create and clearly publicize the benefits that accrue to "parts" willing to be subsumed into the whale.

24. Maxim: Be ready with a total systems plan for integration in case a "punctuated" or sudden decline occur in No. Korean stability.

25. Maxim: Several total systems plans should be prepared each predicated an a different set of contingencies.

26. Maxim: Create plans economic sector by economic sector,

population cluster by population cluster that can be shown to minimize total system investment per unit of productivity or unit of increase in quality of life (in won, energy, manpower, etc.).

27. Maxim: For each economic sector or population cluster seek to establish the maximum number of connections with entities within the unified country and with sectors or clusters in other countries to achieve the maximum operating size of each sector or cluster.

28. Maxim: The new No. Korean social system must be demonstrated to be much more productive and efficient than the old as regards the most numerous and lowest hierarchical levels of society before any attempt is made for it to replace the old.

Conclusion

The most fundamental message emerging from this survey is that there is a universal tendency of entities to combine or integrate into larger wholes, and the mechanisms by which these integrations occur can be known and used to improve the engineering of human systems. About thirty obstacles, thirty promoters, and thirty general systems design propositions or maxims were derived that offer specific insights into the problem of Korean reunification. The most important lessons were first, to integrate the two cultures in hierarchical clusters, emphasizing the lowest, not the highest levels of the social hierarchies, and second, to use a deep systems analysis of the obstacles as positive indicators of performance specifications for reunification. Some of these lessons learned from examination of 15 billion years of natural systems integrations and fragmentations are counterintuitive and, therefore, important new contributions to political intervention.

By careful attention, not only to the lessons from recent social and

political attempts at integration, but also to the vast panorama of integrations and fragmentations in natural systems, the United Koreas could orchestrate one of the more successful), and less violent reunifications in the history of humankind. But most important, by transcending the either-or dichotomy of capitalist vs. socialist states through design of a truly hybrid, integrated alternative for the first time, Korea would make a lasting and truly historical contribution to the evolution of humankind.

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IN-YOUNG CHUN

A Comparative Analysis of South and North Korean Unification Policy, 1945-1996: Consistency and Change

1. INTRODUCTION

Liberation and Division: Blessing and Curse

The surrender of Japan in August, 1945 was a enormous blessing and joy for the Korean people who had suffered from the harsh Japanese colonial rule for 35 years. The liberation of the people from the yoke of the Japanese imperialism, however, simultaneously meant an unfortunate curse for the homogeneous Korean people. Alarmed by the speedy advance of the Soviet forces toward the South, the United States unilaterally and hastily decided to divide the peninsula along the 38th parallel as a temporary measure.[1] With the Stalin's favorable response to accept the American proposal, the hurriedly devised

1. For the further details on the American decision to divide the Korean peninsula, see Michael C. Sandusky, *America's Parallel* (Alexandria, VA: Old Dominion Press, 1983), Chapter 8 (the Month of August).